WHAT IS CLAIMED IS:

1. An image processing apparatus that processes a binary image, comprising:

an input unit that inputs the binary image as a multi-valued image;

a halftone dot image area map creating unit that searches for a halftone dot image area that may be in the multi-valued image and creates a halftone dot image area map;

a line drawing/character area map creating unit that searches for a line drawing/character image area that may be in the multi-valued image and creates a line drawing/character image area map;

a halftone dot image binarizing unit that binarizes an input image corresponding to the halftone dot image area map while suppressing input read error that may occur when said input unit inputs the binary image, and generates a binarized halftone dot image;

a line drawing/character smoothing unit that smoothes a jaggy contained in an input image corresponding to the line drawing/character area map, and generates a binarized line drawing/character image; and

an image combining unit that combines the binarized halftone dot image and the binarized line drawing/character image.

2. The image processing apparatus according to claim 1, wherein said halftone dot image area map creating unit lists and stores at least one of center-of-gravity information about centers of gravity of halftone dots and boundary box information as information about halftone dots in the halftone dot image area.

3. The image processing apparatus according to claim 2, wherein said halftone dot image area map creating unit calculates a halftone dot density in a given area by referring to the center-of-gravity information, and deletes corresponding information from the halftone dot image area map when the halftone dot density does not meet a given condition.

4. The image processing apparatus according to claim 2, wherein said halftone dot image area map creating unit calculates a halftone dot density in one of blocks that correspond to a given area by referring to the center-of-gravity information about halftone dots in said one of the blocks and deletes corresponding information from the halftone dot image area map when the halftone dot density does not meet a given condition.

5. The image processing apparatus according to claim 2, wherein said halftone dot image area map creating unit performs a first process of painting out a boundary

box and a second process of painting out a portion expanding from the boundary box on the basis of the boundary box information, the boundary box and the portion that have been painted out being included in the binarized halftone dot image.

6. The image processing apparatus according to claim 5, wherein, when a gap pixel remains after the first and second processes are performed for each of all the center-of-gravity information, said halftone dot image area map creating unit paints out the gap pixel when a number of gap pixels is smaller than a predetermined threshold value.

7. The image processing apparatus according to claim 1, wherein said line drawing/character area map creating unit detects a closed area from the multi-valued image in order to create the line drawing/character area map, said closed area corresponding to the line drawing/character area.

8. The image processing apparatus according to claim 1, wherein said halftone dot image binarizing unit sets a proximity area close to a target pixel that is included in the input image corresponding to the halftone dot image area map and is to be binarized.

9. The image processing apparatus according to claim 8, wherein said halftone dot image binarizing unit adaptively determines a threshold value for binarization on the basis of a distribution of pixel values in the halftone dot image area.

10. The image processing apparatus according to claim 8, wherein said halftone dot image binarizing unit changes a value of the target pixel on the basis of the distribution, a changed value of the target pixel being used for binarization.

11. The image processing apparatus according to claim 10, wherein, when said halftone dot image binarizing unit detects an inclination in regard of pixel values on the basis of distribution thereof, the halftone dot image binarizing unit does not binarize the target pixel in the absence of change of the value thereof.

12. The image processing apparatus according to claim 10, wherein said halftone dot image binarizing unit determines whether the value of the target pixel should be increased or decreased on the basis of the distribution.

13. The image processing apparatus according to claim 12, wherein said halftone dot image binarizing unit calculates the changed value of the target pixel from a

maximum pixel value available in the halftone dot image area when it is determined that the value of the target pixel should be increased, and calculates the changed value of the target pixel from a minimum pixel value available in the halftone dot image area when it is determined that the value of the target pixel should be decreased.

14. The image processing apparatus according to claim 10, wherein said halftone dot image binarizing unit obtains a difference between the value of the target pixel and the changed value thereof, and restrains the changed value when the changed value is larger than a given threshold value.

15. The image processing apparatus according to claim 10, wherein said halftone dot binarizing unit binarizes original values of target pixels that are not changed and changed values of other target pixels by using a threshold value for binarization.

16. The image processing apparatus according to claim 1, wherein said line drawing/character smoothing unit counts a number of black pixels in each row or column in a given area of the input image corresponding to the line drawing/character area map, and detects the jaggy contained in the input image on the basis of ratios of

black pixels between rows or columns.

17. The image processing apparatus according to claim 16 , wherein said line drawing/character smoothing unit sets a mask in the given area to count the number of black pixels in each row or column in said mask, and shifts the mask to count the number of black pixels only in a new row or column that is not included in the mask before shifting, so that the jaggy can be detected by the numbers of black pixels before and after the mask is shifted.

18. An image processing method that processes a binary image, comprising the steps of:

inputting the binary image as a multi-valued image;

searching for a halftone dot image area that may be in the multi-valued image and creating a halftone dot image area map;

searching for a line drawing/character image area that may be in the multi-valued image and creating a line drawing/character image area map;

binarizing an input image corresponding to the halftone dot image area map while suppressing input read error that may occur at the time of inputting the binary image and thus generating a binarized halftone dot image;

smoothing a jaggy that may be contained in an

input image corresponding to the line drawing/character area map and thus generating a binarized line drawing/character image; and

combining the binarized halftone dot image and the binarized line drawing/character image.